AX Series

Security and Communication System

Architectural and Engineering Specifications

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Product Guide Specification

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* as described in *The Project Resource Manual—CSI Manual of Practice, Fifth Edition.*

The section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all "Specifier Notes" after editing this section.

Section numbers are from *MasterFormat 1995 Edition*, with numbers from *MasterFormat 2004 Edition* in parentheses. Delete version not required.

SECTION 13710 (28 13 00)

SECURITY AND COMMUNICATION SYSTEM

Specifier Notes: This section covers Aiphone Corporation "AX Series" integrated security and communication system. Consult Aiphone Corporation for assistance in editing this section for the specific application.

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Integrated security and communication system.

1.2 RELATED SECTIONS

Specifier Notes: List numbers and titles of sections with work directly related to this section.

A.

1.3 REFERENCES

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Specifier Notes: List standards referenced in this section, complete with designations and titles. This article does not require compliance with standards, but is merely a listing of those used.

A. ISO 9001:2000 – Quality Management Systems – Requirements.

B. TIA/EIA 568 – Commercial Building Telecommunications Cabling Standard.

1.4 SYSTEM DESCRIPTION

Specifier Notes: Edit the system description as required for the project. Consult Aiphone Corporation for more information.

A. Components:
   1. Door stations.
   2. Master Stations: Connect a maximum of seven 16-call add-on selectors Model AX-16SW.
   3. Central Exchange Units (CEU): Connect a maximum of 3 add-on exchange units Model AX-320C.
   4. Power supply.
   5. Other External Connections:

Specifier Notes: Access control system and CCTV system may require custom software programs, not provided by Aiphone Corporation.

      a. Access control system.
      b. CCTV system.
      c. CO line adaptor.
      d. Video output.
      e. PC.

B. Capacities:
   1. Door Stations: Maximum 120 stations with 1 CEU Model AX-248C and 3 add-on exchange units Model AX-320C.
   2. Master Stations:
      a. Maximum 4 stations with CEU Model AX-084C.
      b. Maximum 8 stations with CEU Model AX-248C.
   3. Power Supply:
      a. Model PS-2420UL: 24 V DC, 2 A.
      b. For Audio: 1.
      c. For Video: 2.
   4. Number of Talk Paths: 2.
   5. Number of Video Paths: 2.
   6. All Call: 1, to master stations only.
   7. Video Monitor: 2, same as talk paths and video paths.
   8. Scan Monitor: 1.

C. Calling Master Station from Door Station and Communicating:
   1. Priority Levels for Calls from Door Stations:
      a. Normal.
      b. Priority.

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2. Press door station CALL button.
3. Calling tone rings on master station (for normal call, intermittent tremolo sound; for priority call, rapid intermittent tremolo sound) and selector button LED for individual door station flashes (double-flash for priority call). If door station has camera, video from door station shall be displayed on master station monitor. Call tone continues to ring until answered or is timed out (based on setting). You can stop calling tone by pressing OFF button.
4. If you press individual door station selector button, LED stops flashing and stays lit and you can talk hands-free to that station. If only TALK button is pressed to answer call, hands-free communication initiates with door station at highest priority call. Talk LED lights when you talk and goes off as you listen to caller.
5. Press OFF button again to end communication. Call also ends automatically when set talk limit is reached.
6. If you hold down TALK button for a minimum of 1 second, communication switches to press-to-talk mode. Hold down TALK button to talk and release to listen to caller. You cannot switch back from press-to-talk communication to hands-free communication.
7. If other master station presses selector button of in-use door station or in-use master station, busy signal is heard at master station.
8. Microphone is muted while you hold down privacy button on master station while in communication.
9. You can connect footswitch and use it the same manner as TALK button.
10. Master station can display calls up to 8 stations at the same time. If there are more than 8 incoming calls, they will be displayed in order of priority and time of call.
11. You can adjust calling tone, transmit volume, and receive volume with volume controls at bottom of master station.
12. You can use a headset (not included in system) instead of built-in master station's speaker and microphone.

D. Calling Master Station from Another Master Station and Communicating:
1. Press individual selector button of master station.
2. Pre-tone sounds both master stations and starts hands-free communication. Talk LED lights when you talk and goes off as you listen to caller.
3. Press OFF button to end communication. You can end call from either master station. Call also ends automatically when set communication end time is reached.
4. If called master station has privacy mode set (privacy settings button is lit), communication is only 1-way, from calling master station to called master station, and nothing can be heard from called master side. Press TALK button on called master station for a minimum of 1 second. Press-to-talk communication starts. Hold down TALK button to talk and release to listen to caller.
5. You cannot call master station while it is communicating. You will hear a busy signal.

E. Privacy (PRIV) Function:
1. To make master into privacy mode (prevent monitoring from other stations), press privacy button (LED lights up).
2. To cancel privacy mode, press privacy button again (LED goes out).
3. Privacy setting cannot be changed while in communication.

F. CO Line Call from Door Station and Communication:
1. If CALL button is pressed at door station while CO Transfer feature is set (with CO Transfer button lit), call tone rings on master station (for normal call, intermittent tremolo sound; for priority call, rapid intermittent tremolo sound) and selector button LED for individual door station flashes (double-flash for priority call). At same time, telephone call is placed to programmed CO line number.

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2. You can communicate with door station from telephone.
3. You can end communication at telephone. Communication also ends automatically when set talk time limit is reached. About 10 seconds before end of call, you will hear alarm sound on telephone.
4. Maximum duration for CO line call is 300 seconds, even if call timer is set to "Infinite".
5. Using this function requires Viking Electronics, Inc. "K-1900-5 Hot-Line Pulse Dialer".
6. If there are multiple calls, call from door station with highest call priority is transferred.
7. Answering at any master station during CO transfer feature will stop CO transfer.
8. There are no functions, such as for door release and dial-in, from telephone.

G. All Call (Normal Master Station Paging):
1. When you press ALL CALL button on master station, all individual master station selector button LEDs flash slowly. You can clear undesired master station from All Call by pressing individual master station selector button with flashing LED, which will turn off LED. Pressing that button again makes that master station part of All Call again and makes LED flash.
2. If you press TALK button, send LED lights up and all individual master station selector buttons stop flashing and stay lit. Pre-tone sounds on target master stations and they can be talked to. At this time, you cannot hear audio from other master stations.
3. Press OFF button to end. You can end call for individual master station by pressing its OFF button.
4. All Call announcements do not go to master stations that are in use.
5. During All Call, if you press individual master station selector button on calling master station or press individual master station selector button or TALK button on 1 of the other master stations, communications switch to hands-free between master stations.
6. There is no function for hands-free reply from called master station during All Call mode.
7. If you press down ALL CALL button but do not start talking within 30 seconds, system goes back to standby mode. You can also return to standby by pressing OFF button.

H. All Call (Priority Master Station Paging):
1. When you press ALL CALL button on master station, all individual master station selector button LEDs flash slowly.
2. If you press ALL CALL button again, flash rate increases. You can clear undesired master station from All Call by pressing individual master station selector button with flashing LED, which will turn off LED. Pressing that button again makes that master station part of All Call again and makes LED flash.
3. If you press TALK button, TALK LED lights up and all individual master station selector buttons stop flashing and stay lit. Pre-tone sounds on all master stations and all can be called. At this time, you cannot hear audio from other master stations.
4. Press OFF button to end. You can end call for individual master station by pressing its OFF button.
5. Communication of master station being used is cancelled and All Call takes priority. Before communication of master station being used is cancelled, you hear cancel warning sound.
6. During All Call, if you press an individual master station selector button on calling master station or press individual master station selector button or TALK button on one of the other master stations, communications switch to hands-free between those two master stations.
7. There is no function for talk back from master station receiving an All Call announcement.
8. If you press down ALL CALL button but do not start talking within 30 seconds, system goes back to standby mode. You can also return to standby by pressing OFF button.

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I. Monitor:
   1. If you press individual door station selector button, you can hear audio and if that door station has a camera, you can see image.
   2. Press OFF button to end. Call also ends automatically when set communication end time is reached.
   3. While door station is communicating with or monitored by a master station, you cannot monitor that door station from another master station.
   4. If you press TALK button while monitoring, hands-free communication mode starts with that door station.

J. Scan Monitor:
   1. When scan monitor button is pressed, door stations that have been enabled for "Scan Monitor" in programming can be monitored sequentially for a specified time interval (configured in programming).
   2. Monitoring always initiates from target door station with lowest number.
   3. If you press scan monitor button while individually monitoring target door station, monitoring starts with the next door station in line.
   4. If you press scan monitor button while monitoring non-target door station, monitoring starts with the first door station enabled for scan monitoring.
   5. Press OFF button to end.
   6. Communication/video channel 2 is always used for scan monitoring. During scan monitoring, video signal is always outputted from video output port 2 (V2). Scan monitoring is not possible when communication/video channel 2 is being used, even if busy LED is not illuminated.
   7. Only one master station at a time can perform scan monitoring.
   8. If you press TALK button during scan monitoring, hands-free communication mode starts with that door station.
   9. If you press individual door station selector button or scan monitor button during scan monitoring, monitoring switches to monitoring individual door station.
   10. If master station receives call from door station during scan monitoring, scan monitor function ends automatically and shall be restarted manually.
   11. Scan monitoring continues without limit until it is cancelled, but master station LCD monitor goes out after 10 minutes. Outside video output continues even with LCD off. If you press scan monitor button with LCD off, LCD lights up again.
   12. If you press TALK button during scan monitoring, communication mode starts with door station being monitored.

K. Activating Door Release:
   1. Press door release button during communication or monitoring with door station.
   2. Door release function will be activated, releasing door lock.
   3. You cannot operate door from outside telephone.
   4. LED stays lit while door release function is activated.
   5. Door release contacts can be set to Normally Open or Normally Closed via program configuration.

L. Priority:
   1. Calls have priority based on the time the call was initiated. (Earlier call has priority over later call).
   2. Communication Priority, from Highest to Lowest:
      a. Door station, telephone line communication.
      b. Priority All Call.
      c. Door station to master station communication.

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d. Master station to master station communication.
e. Normal All Call.
f. Monitor.
g. Scan monitor.

1.5 SUBMITTALS

A. Comply with Section 01330 (01 33 00) – Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including installation instructions.

C. Shop Drawings: Submit the following:
1. Wiring Diagrams: Indicate wiring for each item of equipment and interconnections between items of equipment.
2. Include manufacturer's names, model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

D. Installation and Operation Manuals:
1. Submit manufacturer's installation and operation manual, including operation instructions and component wiring diagrams.
2. Provide detailed information required for Owner to properly operate equipment.

E. Warranty: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: ISO 9001:2000 certified company.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

C. Handling: Protect materials during handling and installation to prevent damage.

1.8 WARRANTY

A. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Aiphone Corporation, 1700 130th Avenue NE, Bellevue, Washington 98005. Toll Free (800) 692-0200. Phone (425) 455-0510. Fax (425) 455-0071. Website www.aiphone.com. E-mail info@aiphone.com.

2.2 SECURITY AND COMMUNICATION SYSTEM

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A. Integrated Security and Communication System: Aiphone "AX Series".
   1. Power Source:
      a. 24 V DC, 2 A.
      b. Two PS-2420UL (110 V AC) per video system. One PS-2420UL (110 V AC) per audio system.
   2. Door Station Calling:
      a. Tremolo call tone programmable from 10 to 600 seconds or infinite.
      b. LCD monitor remains on for duration of call-in and communication up to a maximum of 10 minutes.
   3. Master Station Calling: Select station to call, pre-tone sounds, then speak hands-free or push-to-talk.
   4. Communication:
      a. Auto: VOX.
      b. Manual: Press-to-talk, release-to-listen.
   5. Camera: CCD 250,000 pixels.
   6. Video Monitor:
      a. 3.5-inch direct view TFT color LCD.
      b. Scanning Lines: 525.
   7. Door Release: N/O or N/C, programmable per station.
   8. Door Release Contact: 24 V AC/DC, 0.5 A.
   9. Wiring: CAT-5e UTP-4 homerun from each station to CEU.
   10. Distance:
      a. Door Station to CEU: 980 feet maximum.
      b. Master Station to CEU: 980 feet maximum.
   11. CO Line Transfer Adaptor: Viking Electronics, Inc. "K-1900-5 Hot-Line Pulse Dialer".

B. Central Exchange Unit:

Specifier Notes: Specify **one** of the following **two** central exchange unit models.

   1. Central Exchange Unit: Model AX-084C.
      a. Connect: Maximum of 4 master stations and 8 door stations.
      b. Current Consumption:
         1) Video: 620 mA maximum.
         2) Audio: 650 mA maximum.
      c. Video Output:
         1) NTSC standard 1 Vpp (0.7 to 1.4 Vpp).
         2) Two BNC.
      d. Video Output Trigger:
         1) Open collector output.
         2) 24 V DC, 30 mA.
         3) Two RJ-45.
   2. Expanded Central Exchange Unit: Model AX-248C.
      a. Connect: Maximum of 8 master stations and 24 door stations.
      b. Current Consumption:
         1) Video: 1100 mA maximum.
         2) Audio: 1250 mA maximum.
      c. Video Output:
         1) NTSC standard 1 Vpp (0.7 to 1.4 Vpp).
         2) Two BNC.

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d. Video Output Trigger:
   1) Open collector output.
   2) 24 V DC, 30 mA.
   3) Two RJ-45.

Specifier Notes: Include the following when specifying central exchange unit models AX-084C or AX-248C.

e. Master and door stations homerun to CEU for connection and programming.
f. RJ-45 Input Jacks: Station connection, add-on CEU connection, and CO line output.
g. Quick Release: Dry contact terminals for door release functions and power supply connection.
h. RS-232 Connection:
   1) Input: Programming.
   2) Output: Event logging and CCTV/access control interface. Software as specified in Section _____ .
i. Composite video output (BNC).
j. Selective door release programmable to N/O or N/C.
k. CCTV and access integration.
l. Programmable by PC.
m. Rack mountable (2U).
n. Operating Temperature: 32 degrees F to 104 degrees F (0 degrees C to 40 degrees C).
o. Power switch.
p. Power/Communications Error Display LED:
   1) Off: Power off.
   2) Lit: Power on.
   3) Flashing: Error in device or wiring.
q. Ports:
   1) Door station ports.
   2) Master station ports.
   3) Add-on exchange unit ports.
   4) CO line port.
   5) Setting/log port.
   6) Video output ports.
   7) Video output trigger ports.
   8) Door release relay ports.
   9) Power supply ports.

Specifier Notes: Paging adaptor Model AXW-PA1 is optional. Delete if not required.

r. Paging Adaptor: Model AXW-PA1.
   1) Allows paging to external speakers from a door station zone on CEU.
   2) For each zone of paging, use one paging adaptor with appropriate sized amplifier.
   3) Provides outgoing paging only.

Specifier Notes: Specify the following add-on exchange unit if required.

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3. Add-On Exchange Unit: Model AX-320C.
    a. Connect: Maximum of 32 door stations.
    b. Current Consumption:
        1) Video: 200 mA maximum.
        2) Audio: 180 mA maximum.
    c. Power switch.
    d. Add-on unit ID setting switch.
    e. Power/Communications Error Display LED:
        1) Off: Power off.
        2) Lit: Power on.
        3) Flashing: Error in device or wiring.
    f. Ports:
        1) Door station ports.
        2) Add-on exchange unit ports.
        3) Door release relay ports.
        4) Power supply ports.

C. Master Stations:

Specifier Notes: Specify required master station models.

1. Master Stations: [Audio/Color Video Model AX-8MV] [and] [Audio Model AX-8M].
    a. CAT-5e homerun wired to CEU.
    b. Buttons:
        1) 8 individual door station selector buttons with LED.
        2) 8 individual master station selector buttons with LED.
        3) Door release button with LED.
        4) Scan monitor button with LED.
        5) CO line transfer button with LED.
        6) Privacy button with LED.
        7) Oversized TALK button with LED to activate VOX or PTT style communication.
        8) ALL CALL button.
        9) OFF button.
    c. Occupied LED.
    d. Speaker.
    e. Microphone.
    f. Volume Controls:
        1) Receive Switch: Low, medium, high.
        2) Transmit Switch: Low, medium, high.
        3) Call tone.
    g. LCD brightness control.
    h. Jacks:
        1) Headset receiver.
        2) Headset microphone.
    i. Headset Volume Controls:
        1) Receiver.
        2) Microphone.
    j. Directory Cards and Covers:
        1) Master station.
        2) Door station.
    k. Reset switch.

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l. RJ-45 jack for connection to CEU.
m. Connector for add-on selector on master station.
n. Door call-in indicator.
o. Hands-free or push-to-talk communication.
p. All Call to master stations.
q. Scan monitoring.
r. Selective door release.
s. Privacy and mute functions.
t. Wall or desk mount. Metal bracket included for wall mounting.
u. Multi-Pin Connector:
    1) Video output from master station.
    2) External signaling of call tones (through IER-2 or activation of TAR-3).
    3) Footswitch activation for TALK function.
v. Operating Temperature: 32 degrees F to 104 degrees F (0 degrees C to 40 degrees C).

Specifier Notes: Include the following two sentences when specifying master station Model AX-8MV.

w. Monitor: 3.5-inch color LCD, master station Model AX-8MV.
x. Outside Video Output: NTSC standard 1 Vpp (0.7 to 1.4 Vpp), master station Model AX-8MV.

Specifier Notes: Specify the following add-on selector, if required.

2. 16-Call Add-On Selector: Model AX-16SW.
    a. Add to increase number of doors in increments of 16, to a maximum of 120 stations.
    b. Aesthetically matches master stations.
    c. Individual door station selector buttons with LED.
    d. Connector for add-on selector to master station or other add-on selector.

D. Door Stations:

Specifier Notes: Specify required door station models.

1. Audio Door Station: Model AX-DM.
    a. Cover: ABS Plastic.
    b. Mullion surface mount.
    c. Call button.
    d. Speaker.
    e. Microphone.
    f. Locator LED: Red.
    g. CAT-5e homerun wired to CEU.
    h. Weather resistant.
    i. Operating Temperature: 14 degrees F to 140 degrees F (minus 10 degrees C to 60 degrees C).
2. Fixed Color Video Door Station: Model AX-DV.
    a. Faceplate: Aluminum die cast.
    b. Surface mount.
    c. Call Button: Metal.

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d. Camera.
e. Camera Protection: Clear Lexan lens cover.
f. RJ-45 jack.
g. Speaker.
h. Microphone.
i. Directory card.
j. White Illumination LEDs: Automatically turn on in low-light conditions.
k. CAT-5e homerun wired to CEU.
l. Operating Temperature: 14 degrees F to 140 degrees F (minus 10 degrees C to 60 degrees C).
m. Vandal resistant.

3. Fixed Color Video Door Station: Model AX-DVF.
   a. Faceplate: Stainless steel.
   b. Flush mount.
   c. Call Button: Metal.
   d. Camera.
   e. Camera Protection: Clear Lexan lens cover.
   f. RJ-45 jack.
   g. Speaker.
   h. Microphone.
   i. Directory card.
   j. White Illumination LEDs: Automatically turn on in low-light conditions.
   k. CAT-5e homerun wired to CEU.
   l. Operating Temperature: 14 degrees F to 140 degrees F (minus 10 degrees C to 60 degrees C).
   m. Vandal resistant.
4. Fixed Color Video Door Station: Model AX-DV-P.
   a. Proximity Card Reader: Embedded "HID ProxPoint Plus".
   b. Faceplate: Aluminum die cast.
   c. Surface mount.
   d. Call Button: Metal.
   e. Camera.
   f. Camera Protection: Clear Lexan lens cover.
   g. RJ-45 jack.
   h. Speaker.
   i. Microphone.
   j. Directory card.
   k. White Illumination LEDs: Automatically turn on in low-light conditions.
   l. CAT-5e homerun wired to CEU.
   m. Operating Temperature: 14 degrees F to 140 degrees F (minus 10 degrees C to 60 degrees C).
   n. Vandal resistant.
5. Fixed Color Video Door Station: Model AX-DVF-P.
   a. Proximity Card Reader: Embedded "HID ProxPoint Plus".
   b. Faceplate: Stainless steel.

Specifier Notes: Specify flush or surface mount.

   c. [Flush mount] [Surface mount by adding SBX-DVF-P].
   d. Call Button: Metal.
   e. Camera.

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f. Camera Protection: Clear Lexan lens cover.
g. RJ-45 jack.
h. Speaker.
i. Microphone.
j. Directory card.
k. White Illumination LEDs: Automatically turn on in low-light conditions.
l. CAT-5e homerun wired to CEU.
m. Operating Temperature: 14 degrees F to 140 degrees F (minus 10 degrees C to 60 degrees C).
n. Vandal resistant.

E. Compatible Door Stations and Accessories:

Specifier Notes: Specify required compatible door stations and accessories.

1. Audio Door Station: Model IF-DA.
   a. Cover: Plastic.
   b. Surface mount.
2. Audio Door Station: Model IE-DC.
   a. Cover: Plastic and aluminum.
   b. Surface mount.
3. Audio Door Station: Model IE-JA.

Specifier Notes: Specify faceplate material.

   a. Faceplate: [Stainless steel] [Brass, add ICP-BR panel] [Antique brass, add ICP-AB panel].

Specifier Notes: Specify flush or surface mount.

   b. [Flush mount in standard 2-gang box] [Surface mount by adding SBX-2G].
4. Audio Door Station: Model IE-SS.
   a. Faceplate: Stainless steel.

Specifier Notes: Specify flush or surface mount.

   b. [Flush mount in standard 2-gang box] [Surface mount by adding SBX-2G].
   c. Vandal resistant.
5. Audio Door Station: Model IE-SSR.
   a. Faceplate: Stainless steel.
   b. Call Button: Red mushroom.

Specifier Notes: Specify flush or surface mount.

   c. [Flush mount in standard 2-gang box] [Surface mount by adding SBX-2G].
6. Accessory Station: Model HID-SS.
   a. Card Reader: Embedded “HID ProxPoint Plus”.

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Specifier Notes: Specify flush or surface mount.

b. [Flush mount in standard 2-gang box] [Surface mount by adding SBX-2G].

7. CCTV Camera Input Module: Model AXW-AZ.
   a. Converts standard CCTV camera's signal to CAT-5e connection, providing signal compatible with AX system.
   b. Video Output: Continual viewing and/or recording via composite pass-through.
   c. Relay output to trigger external device.
   d. Input for audio door station (IE/IF series).
   e. Sensor input (N/C) to activate call-in function when remote trigger device is activated.

F. Interior Audio Sub Stations:

Specifier Notes: Specify required interior audio sub stations.

1. Interior Sub Station: Model AX-A.
   a. Housing: ABS plastic.
   b. [Surface mount] [Desk mount].
   c. Speaker.
   d. Microphone.
   e. Call button.
2. Interior Sub Station: Model AX-AN.
   a. Housing: ABS plastic.
   b. [Surface mount] [Desk mount].
   c. Speaker.
   d. Microphone.
   e. Call button.
   f. Privacy button.
3. Interior Sub Station: Model AX-B.
   a. Housing: ABS plastic.
   b. Semi-flush mount.
   c. Speaker.
   d. Microphone.
   e. Call button.
4. Interior Sub Station: Model AX-BN.
   a. Housing: ABS plastic.
   b. Semi-flush mount.
   c. Speaker.
   d. Microphone.
   e. Call button.
   f. Privacy button.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive integrated security and communication system.

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B. Notify Architect of conditions that would adversely affect installation or subsequent use.

C. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

A. Install integrated security and communication system in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Mount equipment plumb, level, square, and secure.

C. CAT-5e Cables:
1. Run cables from and homerun to one central location where CEU will be installed.
2. Maximum Cable Runs: Keep each cable run to a maximum of 980 feet from communication device to CEU.
3. Maintain twists of cable pairs to point of termination or no more than 0.5-inch untwisted.
4. Do not remove more than 1 inch of jacket when terminating cables.
5. Cable Bends:
   a. Make gradual bends of cable, where necessary.
   b. Do not make bends of cable sharper than 1-inch radius.
   c. Do not allow cable to be sharply bent or kinked at any time.
6. Cable Ties: Dress cables neatly with cable ties using low to moderate pressure.
7. Cross-connect cables, where necessary, using CAT-5e rated punch blocks and components.
8. Do not splice or bridge cables.
9. Cable Pulling:
   a. Pull cable with low to moderate force.
   b. Do not use oil or other lubricants not specifically designed for cable pulling.
10. Keep cables as far away from potential sources of EMI as possible.
11. Do not tie cables to electrical conduits or lay cables on electrical fixtures.
12. Cable Supports:
   a. Install proper cable supports a maximum of 5 feet apart.
   b. Do not support cables by ceiling tiles.
13. Label Cable Termination Points: Use unique number for each cable segment.
14. Testing Cables: Test installed cable segments with cable tester.
15. Jacks: Install jacks to prevent dust and other contaminants from settling on contacts.
16. Cable Slack:
   a. Leave extra slack on cables, neatly coiled-up in ceiling or nearest concealed place.
   b. Leave a minimum of 1 foot of cable slack at door station side and a minimum of 10 feet of cable slack at CEU side.
17. Do not install cables taught.
18. Grommets: Protect cables with grommets where passing through metal studs or other items that could damage cables.
19. Do not mix TIA/EIA 568A and 568B wiring on same installation. Use TIA/EIA 568B wiring throughout installation.
20. Staples:
   a. Do not use staples that crimp cables tightly.
   b. Do not use T-18 and T-25 cable staples.
21. Use firestop cables that penetrate firewalls.
22. Use plenum-rated cables where mandated.

3.3 ADJUSTING

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A. Adjust integrated security and communication system for proper operation in accordance with manufacturer's instructions.

3.4 DEMONSTRATION AND TRAINING

A. Demonstration:
   1. Demonstrate that integrated security and communication system functions properly.
   2. Perform demonstration at final system inspection by qualified representative of manufacturer.

B. Instruction and Training:
   1. Provide instruction and training of Owner's personnel as required for operation of integrated security and communication system.
   2. Provide hands-on demonstration of operation of system components and complete system, including user-level program changes and functions.
   3. Provide instruction and training by qualified representative of manufacturer.

3.5 PROTECTION

A. Protect installed integrated security and communication system from damage during construction.

END OF SECTION

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